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PROCESS FOR MANUFACTURING A GLASS FIBER AND FIBER COVERED WITH A PROTECTIVE LAYER OF PYROGRAPHITE

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The present invention relates to a process for manufacturing a glass fiber for guiding light, this process bringing about the protection of the fiber by deposition of a protective layer of pyrographite. The invention also relates to a glass fiber covered with a protective layer of pyrographite.

It is known that a glass fiber such as those used in optical transmission must be protected very quickly after it is manufactured, particularly from moisture which causes an attack of the surface of the fiber and consequently defects which can be the starting points of ruptures.

Different solutions are currently known for bringing about this protection. Among them, it is possible to mention coating of the fiber with a resin; this solution is not very satisfactory for several reasons; first of all, the resin is in general not completely impervious; furthermore, aging considerably degrades its characteristics, and finally, deposition of the resin on the fiber most often requires several steps, particularly dipping of the fiber in the liquid resin and then polymerization of this resin. Also known is coating of the fiber with a layer of metal such as aluminum; the advantage of this is that the aluminum forms a good protective screen and does not break down in time; its defect lies in the technological difficulty of deposition of the aluminum on the glass.

The invention relates to a manufacturing process making it possible to protect the fiber with a layer of pyrographite, a process which is both simple to carry out and which provides a good quality screen.

Furthermore, this process can advantageously be conducted continuously during fiber drawing, which is one of the steps of a conventional process for manufacturing of fibers, that is to say without an additional step.

More precisely, the process according to the invention has a fiber protection step during which the glass is heated and a gaseous substance containing carbon, which is capable of decomposition under the effect of temperature in order to form carbon, is injected in the vicinity of the zone where the glass is heated, thus causing the deposition of a layer of pyrographite over the whole periphery of the fiber.

Other objects, characteristics and results of the invention will emerge from the following description which is given as a non-limiting example and which is illustrated by the appended figure which represents an embodiment of implementation of the process according to the invention.

It is recalled first of all that a glass fiber intended for optical transmission is obtained in general from a blank, or preform, which is roughly cylindrical and of relatively large diameter with respect to that of the fiber (on the order of ten mm). This preform is produced out of glass which is generally doped, in order to form in the preform either a gradient of the refractive index in the radial direction, or a sudden variation, or jump, of the index, in order to obtain the light guiding effect. This preform is then drawn in a step called the fiber drawing step, in order to obtain a fiber whose diameter, on the order of a 100 μm, is much smaller than that of the preform.

Represented in the figure, seen in section, is glass preform 1, with torch 5 making it possible to greatly heat the preform locally in order to obtain fiber 2 by drawing. The torch is conventionally made up of an annular device, which receives a gaseous mixture of oxygen and hydrogen through intake 7, which has a continuous opening all around preform 1 through which

flame 8 forms; the torch moreover has cooling circuit 6 which is also annular. The torch extends by enclosure 3, closed by diaphragm 9 allowing fiber 2 to pass through; enclosure 3 has intake 4 for a gaseous mixture containing carbon, for example, included in an organic substance such as acetylene, acetone, benzene, etc. This gaseous mixture is intended to decompose in contact with a hot body, namely fiber 2, and allow the carbon to deposit in crystallized form on this fiber, in order to form a so-called layer of pyrographite, also called pyrolytic carbon. For this purpose, it is preferable for intake pipe 4 not to be too far from flame 8 but at the same time not too close to it. The temperature of fiber drawing, which is generally in the vicinity of 2,000°, is sufficient for the operation of thermal decomposition of the carbon-containing gas on the drawn fiber to occur.

This process therefore allows one to carry out, in a single step, fiber drawing and protection of the fiber, without addition of another step; furthermore, it provides a good quality protective screen, particularly with regard to moisture.

Claims

1. A process for manufacturing of a glass fiber, characterized by the fact that it has a fiber protection step during which the glass is heated and a gaseous substance containing carbon, which is capable of decomposition under the effect of temperature in order to form carbon, is injected in the vicinity of the zone where the glass is heated, thus causing the deposition of a layer of pyrographite over the whole periphery of the fiber.

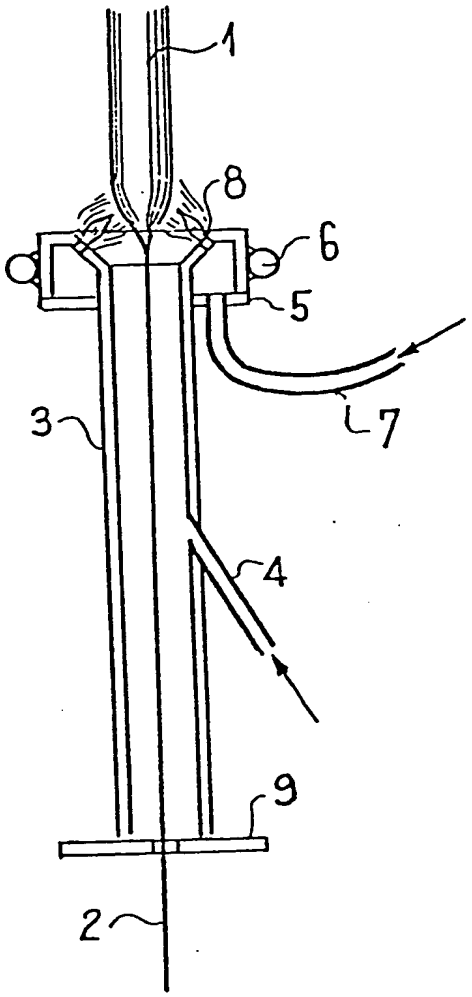
2. A process according to Claim 1, containing a step of formation of a glass preform, and then a step of hot drawing of the preform in order to form the fiber, characterized by the fact that the drawing step is carried out at the same time as the protection step, in the zone where the glass is heated.

3. A process according to either of the preceding claims, characterized by the fact that the gaseous substance contains acetylene.

4. A process according to one of the preceding claims, characterized by the fact that the gaseous substance contains benzene.

5. A process according to one of the preceding claims, characterized by the fact that the gaseous substance contains acetone.

6. A glass fiber, characterized by the fact that it is covered with a layer of pyrographite.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